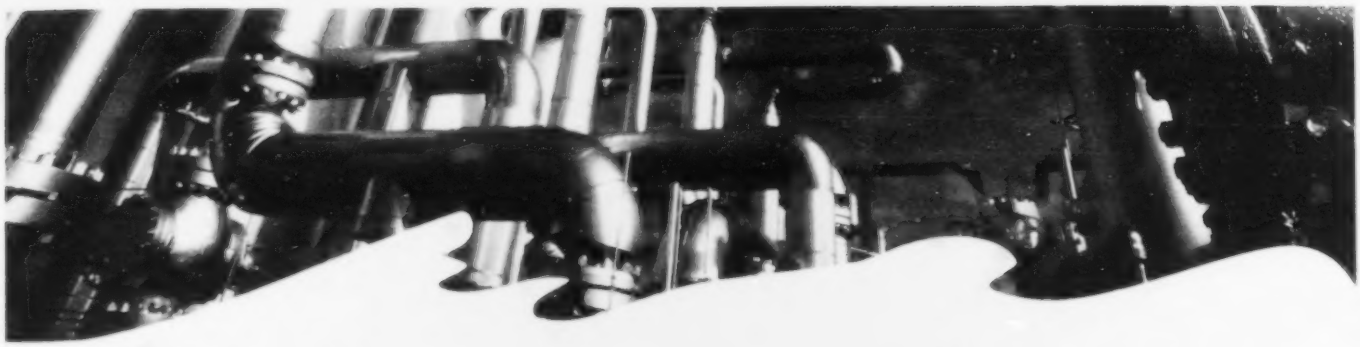
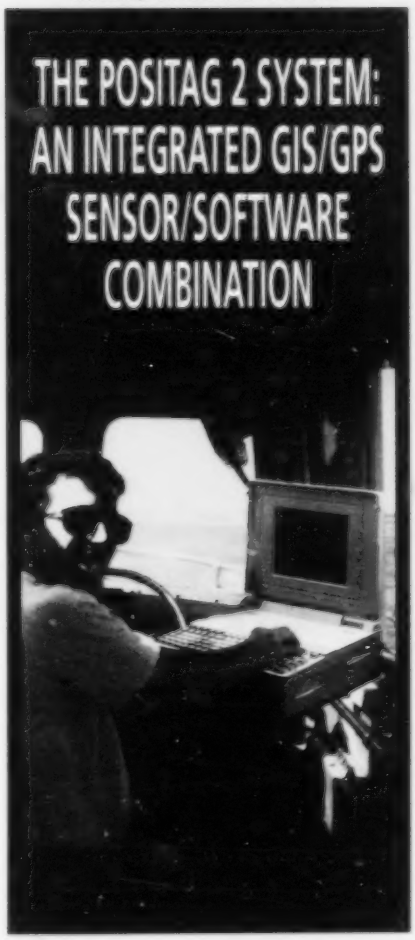


St. Lawrence TECHNOLOGIES

ABSTRACT

Viasat Géo-Technologie Inc. has developed POSITAG 2, a global positioning systems (GPS) sensor that integrates with geographic information systems (GIS) software. Using satellite positioning, remote sensing and digital mapping technologies, POSITAG 2 simultaneously acquires GPS and GIS data in the field, permetting the user to visualize the data immediately. POSITAG 2 precisely identifies the user's geographic position, ensuring that data is collected form the correct site based on available information; this facilitates correctly georeferenced data entry, interactively updating your GIS database and making the information available to other users sooner.

INNOVATIVE TOOL



MAIN FEATURES

- **Components of the POSITAG 2 system:**
  - Software: Microsoft Windows™ compatible; object-oriented software (written in C++)
  - Hardware: NovAtel GPS receiver; Laptop computer with color active-matrix screen
- **System capabilities:**
  - Real-time display of geographic position to within 1-3 m accuracy and interactive control of the screen image
  - Rapid display of vector and raster data
  - Data captured for user-specified parameters as a function of geographical position (including creation of customized data-entry menus)
  - The ability to edit vector data and attributes directly on-screen
  - Imports and exports data using industry-standard formats (e.g., DXF, SIF, ArcInfo, GenaMap, Spans, etc.)

Saint-Laurent Vision 2000

Environment Canada — Environnement Canada

Québec Region — Région du Québec

VIASAT GÉO-TECHNOLOGIE INC.

PROJECT OBJECTIVES

The aim of this project was to develop a user-friendly, field-data acquisition software package using GPS technology, the whole integrated into a graphic environment specific to geographic information systems.

System originality is based essentially on the way it integrates a number of leading-edge technologies which, once combined within the same system, can help resolve problems specific to data acquisition and field location. It also offers features such as on-site visualization of existing data while new field data is being entered, and on-site data modification.

BACKGROUND

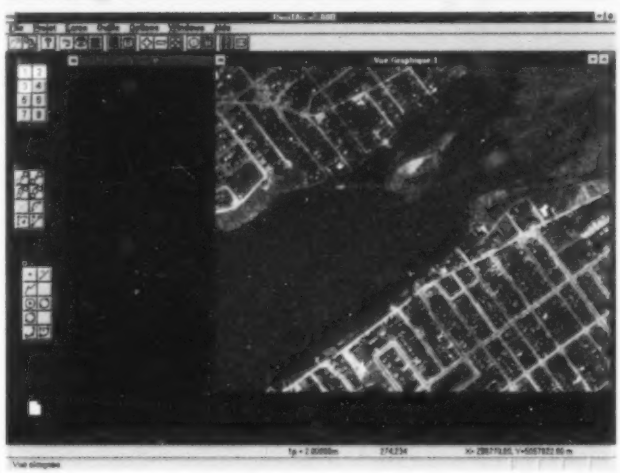
The use of GIS technology has allowed environmental management organisations to compile vast amounts of data from a variety of sources. By adding geographic referencing (GPS) data, the compiled data can be integrated into a single database.

By doing so, these organisations were confronted with the difficulties inherent to computerized data capture. In particular, creating accurate geographical references for the locations of data in the GIS and the related data entry both require considerable effort. POSITAG 2 was specially designed to facilitate GIS input for those responsible for collecting environmental data. In this system, data is integrated directly with its position, wich provides more geographic detail and precision. As a result, information can be more easily integrated into an environmental database, making it available to users more rapidly and in more up-to-date form.

TECHNOLOGY

POSITAG 2 is based on differential GPS technology (DGPS), wich allows the user to locate positions with an accuracy of 1 to 3 metres with respect to the geodetic reference system. Each reference mesurements requires less than 1 second of observation time.

The system is also based on the most recent developments in GIS and remote sensing. The use of these technologies has created a field data-acquisition system that includes the main editing capabilities of a graphic station or an image-processing system. No other system has comparable editing and data-integration abilities.

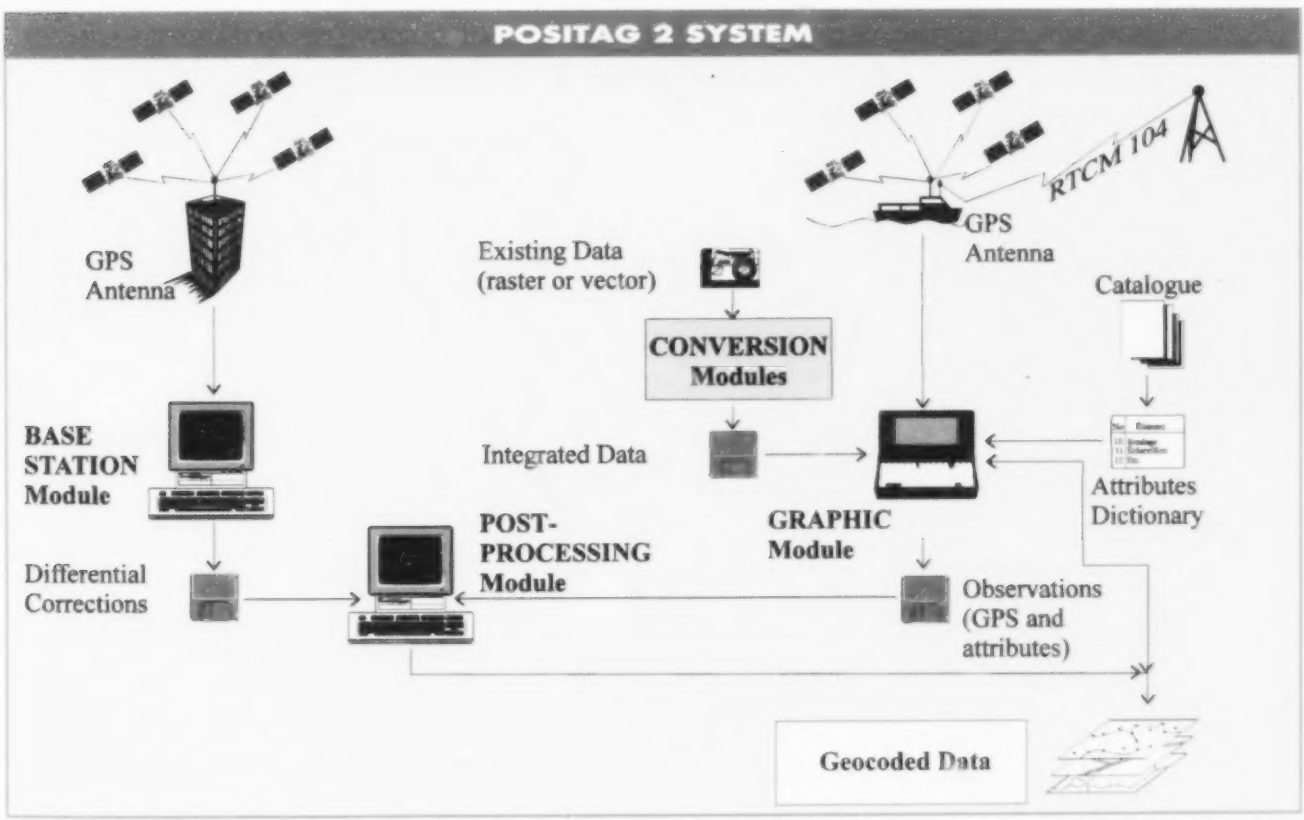


RESULTS

With POSITAG 2, users can move rapidly and precisely towards sites where their intervention is required. The sensor responds to the user in real-time, providing exact positional coordinates and superimposing them on the computer's screen along with other information (e.g., GIS maps, remote sensing data, other map data). The system assigns the current position to all data entered by the user via the computer's keyboard, and allows users to define a data-entry form customized to their own needs. Upon returning to the office, the input data can be easily manipulated to permit integration of the georeferenced data into existing databases, making them immediately available to other users.

The POSITAG 2 system offers users:

- A module that calculates geographic positions with an accuracy of 1 to 3 m.
- The ability to display the current position of users on the screen as rapidly as they change position, as well as displaying the data collected at that position.
- The ability to combine vector mapping data with raster form data (e.g., satellite images, scanned maps, and ortho-photographs) so both can be referenced to actual field locations.
- An efficient data-storage structure that permits the rapid display of the data and rapid scrolling through the image by the user.
- Powerful graphical editing functions that permits the user to add, delete, move, redirect and otherwise modify the elements of vector map and attributes.
- A utility that points the user in the direction of a position with known coordinates, facilitating speedy and accurate travel in the field.
- A utility to create predefined forms that permit users to enter data attributes and extract them immediately from a "dictionary" to speed data entry and reduce errors.



POTENTIAL AND LIMITATIONS

POTENTIAL

POSITAG 2 has potential use in any natural resource management, environmental monitoring, or land management application. In environmental applications, the system permits users to accurately pinpoint phenomena observed in the field (e.g., gas leak, oil spills, forest fires, etc.), as well as the locations of stationary equipment or sampling points. In marine applications, it can be used to directly digitize areas affected by spills of toxic products and to map shorelines or plan communities precisely.

In forestry, the system facilitates forest inventoring and mapping, including the ability to locate harvest blocks and determine their sizes and other parameters. Geologist and other earth-sciences specialists can also make use of the system when they must cover vast track of remote territory to reach a specific location, such as a sampling site. This is particularly useful for regions in wich maps are inadequate, inaccurate or even nonexistent.

For road network applications, POSITAG 2 can be used along with existing systems to monitor the state of the roads, permitting more targeted interventions. In conjonction with topographical data, the system can also be used to identify new roads and to perform map-updating.

LIMITATIONS

The accuracy of the data collected by POSITAG 2 depends entirely on the sensor equipment used and the mode of operation. Survey accuracy may vary depending on the nature of data decoded by the GPS receiver used. To ensure the highest accuracy, data must be captured with a sensor operating in differential mode.

INFORMATION

This data sheet is based on the results of a project conducted by Viasat Géo-Technologie Inc., with funding from the Environmental Innovation Program of Public Works and Government Services Canada and from the Technology Development Section of Environment Canada.

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St. Lawrence TECHNOLOGIES

St. Lawrence Technologies data sheets are intended for all companies, industries, organizations and individuals interested in new environmental technologies. They are produced by the Technology Development Section, Environment Canada, as part of the Saint-Laurent Vision 2000. They serve to disseminate the results of technology development and demonstration projects conducted in the following four sectors: industrial waste water; contaminated soil; hazardous wastes; contaminated sediment and innovative tools.

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Canada